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Introduction

The Integrated Medical Information Technology System (IMITS) Program is focused on implementation of advanced technology solutions that eliminate inefficiencies, increase utilization and improve quality of care for active duty forces. The work on this project has focused on the development and implementation of prototype telemedicine systems and advanced technology applications at United States Air Force bases. Significant effort has been devoted to the DITSCAP security process for the applications developed. Emphasis has been placed on the development of sound evaluation methodologies for each of the sub-projects with special attention to the areas of cost effectiveness and end-user satisfaction within the AFMS.

Body

Teleradiology

Implement a working Teleradiology system in the Air Force leveraging the system already in use at University of Pittsburgh Health System (UPMC).

The Stentor iSite and iVault COTS products have been installed at Wright Patterson AFB in Dayton, Ohio since 2003. Wright Patterson, Stentor and UPMC began planning and preparing for upgrading to Stentor version 3.2.2 much of the latter half of 2004. In November 2004 Stentor received DITSCAP certification for version 3.2.2 which will be installed and in production, at Wright Patterson, in early 2005.

Develop and implement a prototype workflow model using a DTS enabled infrastructure.
Requirements for this project were obtained from Wright Patterson Air Force Base Medical Center (WPMC). Development of the DTS enabled infrastructure prototype for WPMC was completed in May 2004. The DTS infrastructure provides the Radiologists at WPMC a more robust and efficient way to view radiological images.

Create a prototype intelligent DICOM dispatcher.
Requirements for this project were obtained from Wright Patterson Air Force Base Medical Center. Development of the intelligent DICOM dispatcher for WPMC was completed in July 2004. The intelligent DICOM dispatcher includes the ability to display nurse units and departmental radiology study work lists to clinicians throughout WPMC.

Develop a prototype reporting and dictation infrastructure.
UPMC is developing, for internal purposes, a reporting and dictation infrastructure and plans to use the base source code of the UPMC infrastructure for WPMC. UPMC will assist WPMC in developing requirements for a reporting and dictation infrastructure during the development of the WPMC intelligent DICOM dispatcher prototype. WPMC will most likely be perusing the use of a COTS reporting and dictation product.

Develop and evaluate a prototype Secondary Capture (SC) DICOM wrapper that will allow incorporation of arbitrary and visible light datasets into the DICOM archive.

UPMC has developed a Secondary Capture (SC) DICOM wrapper to incorporate visible light datasets into a DICOM archive. UPMC is beta testing the Secondary Capture (SC) DICOM wrapper prototype internally. At this time WPMC has no need for this service.

Develop and implement a system for transferring images to a civilian location for interpretation.

This SOW was not contained in the original proposal. The initial intent of the Teleradiology project was to put the infrastructure in place so that Wright Patterson could become a hub in a Teleradiology network and provide interpretation services for hospitals and clinics with excess demand. In the spring of 2003, Wright Patterson faced the loss of radiologists due to deployment and attrition. The Diagnostic Imaging Flight Commander at Wright Patterson asked UPMC for assistance in establishing a Teleradiology link to Kettering Medical Center in nearby Kettering, Ohio to facilitate outsourcing of radiology interpretation. A secure VPN connection was established and a system was put in place in October 2003. An off-site/civilian location software management system was developed and deployed by UPMC for the Wright Patterson Radiology Department and the Kettering Medical Center in July 2004. Radiologists at Kettering Medical Center are now reading and dictating Wright Patterson studies.

Evaluate the impact of implementation and usage of the prototype Stentor Image and Information Management System at Wright Patterson Medical Center.

Research is focused on user satisfaction, system functionality, and changes in timeliness, work efficiency and patient care. The study consists of surveys, interviews, site visits and diagnostic imaging statistics.

<u>Project Delays</u>

Mandatory DOD security compliance requirements (DITSCAP) forced delays in system installation and full functioning at the Medical Center. Effective December 2003, Stentor System 3.1 passed all requirements and DOD approval was granted for operations.

<u>Progress</u>

Stentor 3.1 has been operational at Wright-Patterson since December 2003. This system is undergoing additional system and security upgrades in compliance with project objectives. By mid February, the upgraded system (Stentor 3.2) is projected to be operational. This upgrade will bring the system into compliance with general project objectives for system installation at Wright-Patterson.

Evaluation activities have been conducted in alignment with project development activities. Baseline surveys, interviews and site visits were conducted prior to Stentor's implementation and follow-up intermittent surveys and site visits have been conducted to track progress. Post survey data was collected for Stentor 3.1 in January 2005 and will be compared with baseline findings as well as final survey data to be collected for Stentor 3.2. Final interview and site visit data will also contribute to an understanding of the impact of Stentor at Wright-Patterson.

See attachment: *A. Teleradiology Evaluation Timeline*

Surveys
Baseline surveys were completed in conjunction with Stentor staff training conducted in May, 2003. Pulse surveys (i.e., intermittent abbreviated surveys) were completed every few months across a subset of users to track system acceptance and potential barriers to adoption and use.

Table: Surveys: Time Points and Users

Users	Time Point 1	Time Point 2	Time Point 3	Time Point 4	Time Point 5	Time Point 6	Time Point 7
	Baseline Surveys		Pulse Surveys			Post Survey 3.1	Post Survey 3.2
	4/2003	12/2003	3/2004	6/2004	9/2004	1/2005	6/2005*
Radiologists	4	4	4	4	3	5	---
Technologists	23	21	3	2	16	18	---
Clinicians	3	2	6	3	3	10	---
Others	2	2	2	0	2	1	---

* Projected date of future survey implementations.

See attachment: *B.. Teleradiology Survey Findings*

Interviews
Pre-implementation interviews were conducted with a subset of radiologists (n=5), technologists (n = 4) and clinicians (n = 4). Informal interviews were also conducted with two key project administrators at Wright-Patterson who were retiring from the Air Force. Interviews are undergoing comprehensive analysis and will contribute to an understanding of barriers, supports and lessons learned from the project.

Site Visits
Researchers have made seven site visits to Wright-Patterson AFB to conduct surveys and discuss usage and satisfaction with staff that routinely interfaces with Stentor.

Diagnostic Imaging Statistics
Diagnostic Imaging Department productivity is being tracked based on CHCS database statistics. This information will parallel project implementation and system upgrades.

Workflow Analysis
Site visits and interviews contributed to a workflow analysis of staff practices and interactions with the diagnostic imaging systems. Changes in staff roles and responsibilities in processing diagnostic images are being tracked across systems.

See attachment: *C. Teleradiology Preliminary Findings*

IRB Approval Process
The research is being planned and conducted in a manner consistent with the goals of the project. Evaluation studies are being conducted with the full approval of investigation review boards

(IRBs) at each institution and medical center involved in the conduct of the studies. The IRB review process has proven to be a time-consuming process. It is significant to note the work effort and time involved in securing full IRB approvals.

Telepathology

Implement a prototype static telepathology system within the Air Force leveraging the system already in use at UPMC Health System.

Design, develop and implement a prototype telepathology workflow application.

Evaluate compliance of the prototype telepathology system with the Common Criteria for Information Technology Security Evaluation (C2) data security requirements and perform the needed remediation to submit system for C2 certification.

Static Telepathology

UPMC Static Telepathology System received DITSCAP certification in November of 2004. Since that time, the static system was implemented at Keesler AFB and Eglin AFB. Air Force personnel have used the system and have identified minor operational difficulties. Specifically, the adapter lens purchased and shipped was not the lens needed, and that the OTC camera software proved hard to use. UPMC has ordered the correct lens and will provide UPMC image capture software (vide infra). Additionally, UPMC will assist with the use of the software that they purchased.

Evaluate the utility of digital slide pathology in the Air Force environment.

An Aperio WSI system was installed at Keesler. It was tested, and Keesler personnel were trained to operate the device. UPMC and Keesler personnel implemented pathology teaching material and examinations based on WSI performed at Keesler, and plans are being made to test and utilize this technology in the clinical environment.

At the same time, UPMC has implemented a research and development team that has been examining the utility of WSI in the clinical environment. Four IRB approved clinical evaluations of WSI in 1) Quality Assurance, 2) Primary Diagnosis, 3) Internal Consultation and 4) External Consultation have been designed, approved and underway. Formal results of the first study will be available by the end of February, and the other studies will be completed by July 2005. All studies will be co-published with Air Force personnel. Preliminary results indicate uniformly diagnostic image quality and little discrepancy with the results of direct class slide examination.

During the past six months, there has been a significant improvement in image quality, speed and reliability. The attached evaluation report will help explain the activities involved with the WSI effort.

Implement a prototype dynamic telepathology system at Keesler AFB, Eglin AFB and Travis AFB.

In 2004, UPMC conducted a review of commercially available products for robotic telepathology. The Nikon CoolScope was chosen for use in static robotic telepathology because of the availability of the source code from the manufacturer and because of significantly lower cost. The software was demonstrated at UPMC for the Air Force during the summer of 2004. Air Force security issues surrounded the CoolScope product, and significant "work-arounds" have been required to isolate the CoolScope software from the Air Force network. A system is in place, and a CoolScope is operational at Travis Air Force Base.

UPMC is currently attempting to extend the DITSCAP certification for Static Telepathology to include the CoolScope based robot telepathology. Additionally, the developed CoolScope software is being modified to work with the Air Force's move to Windows XP (it was originally designed in Windows 2000). It is expected that CoolScopes will in implemented at Keesler and Eglin AFB in 2005.

See attachment: *D. Dynamic Telepathology Vision and Scope Document.*

Design and develop trial software to identify image quality.

A bright field image capture system has been developed to capture high-resolution digital RGB images of histopathological tissue samples (this is the software being added to the static telepathology system, vide supra). The software provides a histogram dialog box that provides a graphical representation of white balance and under/over exposure for a given image. The system assists the user to capture an image of the highest quality color and focus. This software will be included in UPMC Static Telepathology v.2.

In addition, UPMC has developed software that evaluates image focus in whole slide images. This software is implemented in the UPMC WSI protocols and has been important in improving image quality as discussed above. This link http://telepathology.upmc.edu/imits/wholeslide/index.htm is a report that explains WSI image quality evaluation effort.

Evaluate the impact of implementation and usage of Static Image Telepathology at Keesler, Elgin and Travis Medical Centers.

The purpose of this research is to evaluate usage and acceptance patterns for pathologists interfacing with static image telepathology systems in pathology departments at Keesler, Eglin and Travis AFBs. The study has three parts: 1) Surveys - conducted pre, intermittent and post implementation, 2) Interviews - conducted pre and post implementation, and 3) User Activity Reports of frequency and patterns of use across system components.

Project Delays

Mandatory DOD security compliance requirements (DITSCAP) forced delays in system installation. Effective September 2004, Static Image version 1.2 passed all requirements and DOD approval was granted for operations.

Progress

IRB exempt approval was obtained and pre-implementation interviews were conducted with pathologists at Keesler and Eglin. Surveys were conducted in conjunction with applications training at each site following applications training sessions. Staff at Keesler received training for Static Image version 1.1 in December 2003 and for Static Image version 1.2 in September 2004. Staff at Eglin received training for Static Image version 1.2 in September 2004. Pathologists at Travis will be interviewed and trained in 2005.

Surveys

Baseline surveys were completed in conjunction with Static Image applications training. Survey data from Time Points 1 & 2 serves as a baseline measure of perceptions of the system's performance and potential impact on patient care. Time Point 3 provides preliminary data on users' early acceptance and adoption of the system. A summary of initial findings is included.

Table: Surveys: Time Points and Users

Users	Time Point 1	Time Point 2		Time Point 3
	Static Image 1.1 Baseline Keesler	Static Image 1.1 Post Keesler	Static Image 1.2 Baseline Keesler & Eglin	Static Image 1.2 Intermittent Keesler & Eglin
	2/2004	8/2004	8/2004	1/2005
Pathologists	8	3	5	8
Others	3	1	4	2

See attachment: *E. Telepathology Survey Data*

Interviews

Pre-implementation interviews were conducted with a subset of pathologists (n = 5). Interview data is currently being analyzed and will contribute to baseline workflow analysis and user functionality and satisfaction information.

Site Visits

Researchers have made three site visits to Keesler AFB and two to Eglin AFB to conduct interviews and surveys and to discuss perceptions of use and satisfaction with staff that may interface with the Static Image systems.

User Activity Statistics

User activity is being tracked and will supplement survey and interview findings.

IRB Approval Process

The research is being planned and conducted in a manner consistent with the goals of the project. Evaluation studies are being conducted with the full approval of investigation review boards (IRBs) at each institution and medical center involved in the conduct of the studies. The IRB review process has proven to be a time-consuming process. It is significant to note the work effort and time involved in securing full IRB approvals.

See attachment: *F. Telepathology IRB Flowchart*

Pediatric Tele-echocardiography

Design, develop, implement and evaluate a prototype pediatric tele-echocardiography system for use in the Air Force.

Children's Hospital of Pittsburgh (CHP) and UPMC conducted an evaluation of the COTS videoconferencing products for potential use in this project. In consultation with the DoD Video Network Center in San Antonio, Texas a decision was made to use PolyCom equipment for this project. It was also determined that MEDNet was the appropriate communications link. Eglin AFB and the Naval Hospital Pensacola had a pre-existing node on MEDNet but Keesler AFB did not. It was decided that Keesler would use commercial ISDN for this project until such time as a MEDNet node becomes available.

Installation of equipment occurred in February of 2004 but was complicated by ISDN connectivity issues. After working the issues through the Kessler Communications group, the system went technically live in May 2004. Several test cases were completed between Keesler and Children's Hospital of Pittsburgh.

Changes in personnel also had a significant impact on this project. In June 2004 the Pediatric Cardiologist at Keesler separated from the Air Force. A replacement was not slated until sometime in the fall of 2004. The project would be idle until the new person arrived.

In July 2004 the adult sonographer from Eglin AFB traveled to Pittsburgh for observational training at Children's Hospital of Pittsburgh. She spent three days observing Pediatric echos in the lab and ICU. For health reasons, the adult sonographer at Pensacola Naval was unable to attend this session and will be rescheduled at a later date.

The new pediatric cardiologist arrived in November 2004. After an orientation period to Keesler she will begin outreach clinics in early 2005 and will be prepared to implement the pediatric tele-echocardiography program.

Evaluate the regional impact of a prototype pediatric tele-echocardiography system in Tri-Care Region 4.

A detailed evaluation study has been developed to gain information about perceptions of the *use* of the tele-echocardiography equipment. The study has three parts: (1) surveys following each tele-echocardiography session; (2) interviews - conducted pre and post; and (3) monthly patient care statistical reports from TRICARE Region 4.

<u>Project Delays</u>
Although equipment was installed in January 2004, project implementation was delayed pending resolution to ISDN issues. At the time that the system went clincially live in May 2004, the pediatric cardiologist was retiring from the Air Force and his replacement would not be on base until late 2004.

Progress

Site visits were conducted at all three locations in October 2003 and September 2004. The sonographer from Eglin AFB participated in two days of pediatric echocardiography training at Children's Hospital of Pittsburgh. During the visit, a pre-implementation interview was conducted with the sonographer. A new pediatric cardiologist began her assignment at Keesler in November and she has agreed to serve as Principal Investigator for the study. Additional evaluation actitivities will not be conducted until the new cardiologist is ready to begin work on this project.

The planned evaluation study has been approved by UPMC and Wilford Hall IRB with concurrence agreements in place from Eglin and Keesler IRBs. IRB concurrence is still being sought for Pensacola Naval Hospital.

See attachment: *G. Tele-Echocardiography Study IRB Approval Process*

Emergency Medical Services

Emergency Medicine Triage Database

Adapt existing UPMC medical facility database for pilot use in the Air Force.

Air Force personnel evaluated the contents of the existing UPMC international medical facilities database in June 2003. Based on those recommendations, UPMC has restructured the database to include the new fields. UPMC and the AF identified a lack of information in the database for the Central and South American region.

In March 2003 the web build out of the database began and was completed in June 2004. The database has been updated with the new fields recommended by the Air Force. In addition links to State Department alerts and CDC bulletins have been provided.

The World Hospital and Airport Database is available at http://whad.stat-md.com.

EMEDS Wireless Demonstration

Evaluate the communication equipment and security requirements and establish security recommendations and configuration design document for a prototype wireless local area network broadband telecommunication network.

The subcontract for MountainTop Technologies was executed January 2004. From February to June 2004 the project oversight was provided by program management staff in the Air Force Surgeon General's Office. There were numerous attempts by SGR program management to contact EMEDS staff at Fort Detrick and set up meetings to clarify the work to be performed. In late June 2004 the program management staff at SGR changed. In July 2004 new contacts were made at Ft. Detrick and it was determined that the original SOW was no longer applicable. Instead the Air Force was in need of assistance with documentation on the network configuration and security/HIPAA requirements for the current wireless configuration of the EMEDS tents. A new SOW was developed and approved by the Air Force in November 2004. The first organizational meeting was held on December 2, 2004 at Fort Detrick Maryland. In order to complete this work, MountainTop asked for and was granted an extension of the project period to March 31, 2005.

See attachment: *H. Revised Statement of Work.*

Telemental Health

Design, implement and evaluate a telemental health pilot project in the Air Force.

This project was discontinued due to multiple reasons including:

- Administrative changes in the flight command for psychiatry at Wilford Hall Medical Center (WHMC), Lackland AFB, San Antonio, Texas
- Command changes at WHMC
- Level of support TRICARE Region 6 lead agent.

Teleradiation Oncology

Develop and implement a model for delivery of IMRT treatment planning in an MTF.

This project was discontinued because a suitable IMRT site could not be found within the Air Force.

Major Barriers

Security Certification

The DITSCAP certification process continues to be a major barrier. The most significant issue is the extended time period for the entire process to be complete. As an example, the process for telepathology took 18 months from the time the first documentation was submitted to the award of the CTO in October 2004.

As noted in the 2003 Annual Report the following issues continue to be a problem:

- Extended period of time for AF security personnel to review and provide feedback on required security documents.
- Shortage of AF security personnel causing significant delays in scheduling testing dates.
- Change in priorities for AF security personnel caused planned security testing to be rescheduled or delayed.

In addition to those items previously listed, the entire process becomes much more complex when the application is utilized between MTFs within two or more Major Commands. Each MAJCOM has the right to review the certification process and control security within its own command. This creates the following issues:

- Final DITSCAP certification requires that the application be running in its native environment. This requires an Interim Authority to Operate (IAtO) from each MAJCOM where the application is active. This extends the time it takes to get through DITSCAP certification.
- Each MAJCOM controls the ports and protocols it will allow on the network. This often requires negotiation between MAJCOMs regarding the appropriate protocols.

UPMC is addressing this issue with the AF Surgeon General's Office. In order for future tele-technology implementation to be deployed in a timely fashion these issues must be addressed.

IRB Approval Process

The United States Army Medical Research Acquisition Activity is the contracting office for this award. The award agreement specifically prohibits human subject research without approval from the Army. Due to the nature of our telemedicine initiatives, our projects involve numerous sites in the Air Force and one site in the Navy. Each of the IRBs at these sites had the right to review human subject research that will occur at their base. And finally, the evaluation studies conducted by UPMC personnel must be reviewed by the University of Pittsburgh IRB. This sets up a very complex situation of application and approvals that continues to be a major barrier. As an example, the Pediatric Tele-echocardiography project requires approval by 5 IRBs, Pitt, Keesler, Eglin, Pensacola Naval and the Army. The approvals cannot be done at the same time as each entity wants to see the approval of the others and the Army will not approve without seeing all of the local approvals. This creates significant delays in the process creating disruption to the implementation timelines for evaluation.

As noted above, we are still awaiting approval of the Navy IRB for the Pediatric Tele-echo study. UPMC was recently contacted and advised by the Navy that they would not approve the proposed protocol as exempt as had been done by all other IRBs. Instead the Navy prefers to conduct a full review. This sets up a very tenuous situation between IRBs and may call into question the judgment of the IRBs that have previously approved the protocol as exempt. UPMC is hopeful that this situation can be resolved and the protocol approved as exempt.

UPMC is working with the Surgeon General's office to find a suitable solution to these issues. Until such time as all branches of the service can agree on a process, there will continue to be extended delays for IRB approvals.

Key Research Accomplishments

Teleradiology

2003

- Implementation of a state-of-the-art PACS/Teleradiology system (Stentor) at Wright Patterson AFB.

- Stentor is the first and only vendor to complete the DITSCAP process.
- Developed beta version of DICOM wrapper for visible light images.

2004

- Implementation of customized clinician wrapper using DTS enabled infrastructure.
- Implementation of shared worklist using intelligent DICOM dispatcher.
- Implementation of a system for transferring images from Wright Patterson AFB to Kettering Medical Center for interpretation.

Telepathology

2003

- Development of UPMC Static Telepathology v.1 for use at Keesler AFB.
- Successful completion of initial DITSCAP security testing process.
- Evaluation and testing of whole slide imaging system.
- Development of enhanced image capture software for UPMC Static Telepathology v.2.

2004

- Final DITSCAP approval and implementation of UPMC Static Telepathology v.2 between Keesler and Eglin AFBs.
- Development of beta version of secure CoolScope for testing within Air Force environment.
- Development of software that evaluates image quality

Pediatric Tele-echocardiography

2003

- Equipment evaluation and selection
- Network infrastructure design and development
- Creation and approval of Standard Operating Procedure for pediatric tele-echocardiography.

2004

- Installation of equipment at Keesler, Eglin and Pensacola Naval
- Go-Live May 2004
- Training for one adult sonographer

Emergency Medical Services

Emergency Triage Database

2003

- Revision of existing UPMC database with DoD specific information
- Addition of medical facility information for Central/South America Region.

2004

- Build out of web access to the database.
- Beta version of site available for review

EMEDS Wireless Demonstration

2004

- Re-scope of project based on the needs of the Air Force.

Reportable Outcomes

Please see Appendix for work product documentation.

Conclusions

The Air Force has and will continue to benefit greatly from the work done on the IMITS Program. In Year Two customizations were added to the COTS PACS/Distributed Imaging System at Wright Patterson. The connection to a civilian facility was designed, built and implemented with work sharing capability between military and civilian facility. With continued funding, this model will be scaled up to include multiple MTFs that cross multiple MAJCOMs.

Keesler and Eglin AFBs now has the only DITSCAP certified Static Telepathology system in the DoD. New cutting edge image capture devices will be added to this architecture in the coming year.

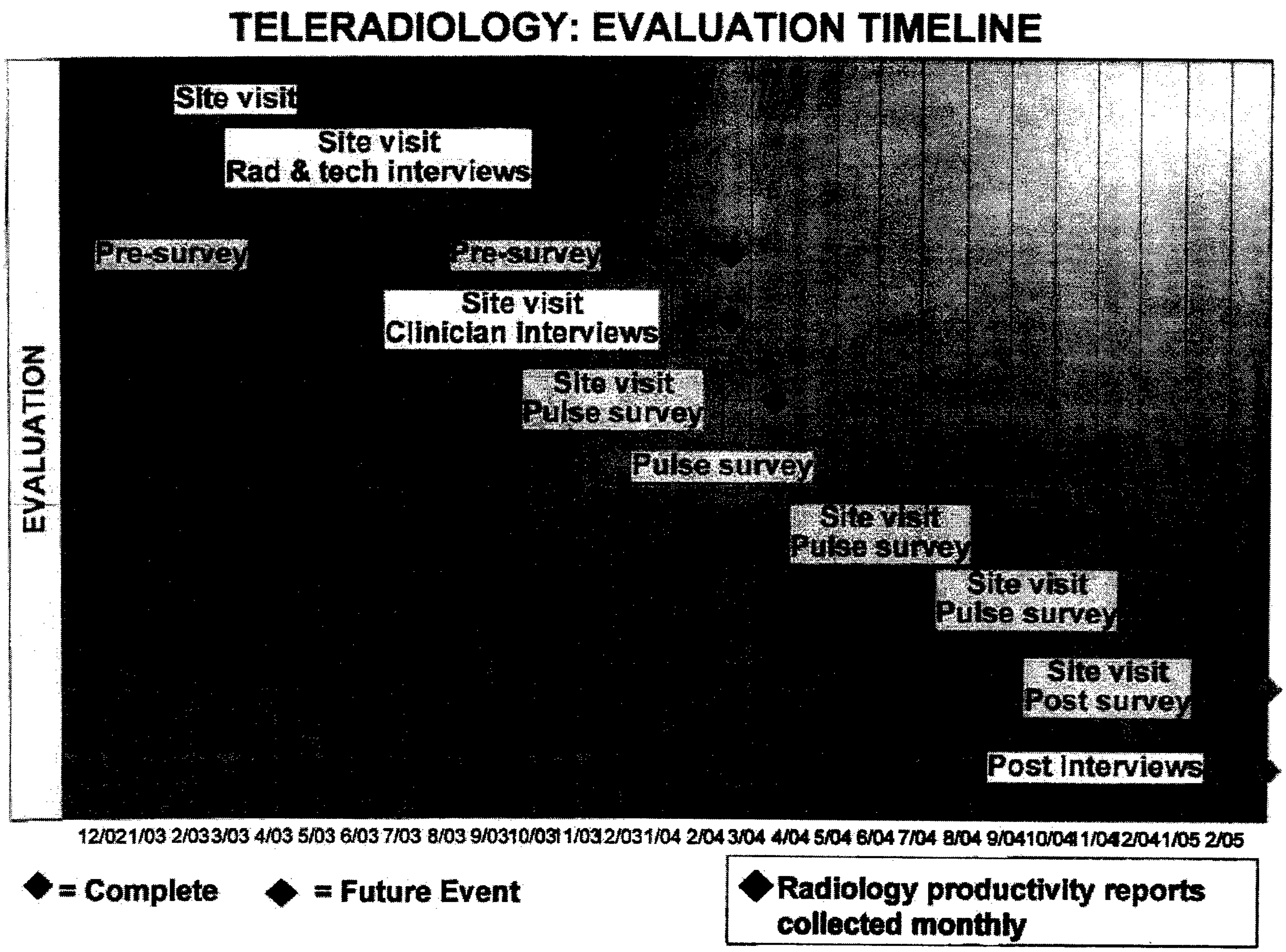
Evaluation of all these projects is ongoing. Preliminary evaluation of the data suggests that there is a clear return on investment for the DoD and UPMC in the areas of productivity and efficiency. These findings will be summarized in a formal evaluation document under separate cover.

References

None

Appendices

A. Teleradiology Evaluation Timeline



B. Teleradiology Survey Findings

Teleradiology: Stentor Survey Findings – Time Points 1 - 6

TIME POINT 1	Radiologist (4)	Clinician (3)	Technologist (23)	Other (2)	Total (32)	Percent
Q1 - Image quality will be comparable to or better than the current PACS system?						
Strongly Agree	1	0	7	2	10	31
Agree	1	3	14	0	18	56
Not Sure	2	0	2	0	4	13
Disagree	0	0	0	0	0	0
Strongly Disagree	0	0	0	0	0	0
No answer	0	0	0	0	0	0
	4	3	23	2	32	100
Q2 – There will be wide-scale availability to the Stentor system in the Medical Center?						
Strongly Agree	1	1	9	1	12	38
Agree	2	1	11	0	14	44
Not Sure	1	1	3	1	6	18
Disagree	0	0	0	0	0	0
Strongly Disagree	0	0	0	0	0	0
No answer	0	0	0	0	0	0
	4	3	23	2	32	100
Q3 - You will be able to access the Stentor system outside of the Medical Center?						
Strongly Agree	2	0	7	1	10	31
Agree	1	2	6	0	9	28
Not Sure	1	1	7	1	10	31
Disagree	0	0	1	0	1	3
Strongly Disagree	0	0	2	0	2	0
No answer	0	0	0	0	0	0
	4	3	23	2	32	100
Q4 – You will be able to query the system to locate patient information and bring up images?						
Strongly Agree	1	1	10	2	14	44
Agree	2	2	13	0	17	53
Not Sure	1	0	0	0	1	3
Disagree	0	0	0	0	0	0
Strongly Disagree	0	0	0	0	0	0
No answer	0	0	0	0	0	0
	4	3	23	2	32	100
Q5 – The system will display current Stentor images in less than 5 seconds?						
Strongly Agree	1	1	8	2	12	38
Agree	0	2	8	0	10	32
Not Sure	3	0	7	0	10	32
Disagree	0	0	0	0	0	0
Strongly Disagree	0	0	0	0	0	0
No answer	0	0	0	0	0	0
	4	3	23	2	32	100
Q6 – The system will display prior/archived Stentor images in less than 20 seconds?						
Strongly Agree	0	2	8	2	12	38

TIME POINT 1	Radiologist (4)	Clinician (3)	Technologist (23)	Other (2)	Total (32)	Percent
Agree	0	1	8	0	9	28
Not Sure	4	0	6	0	10	31
Disagree	0	0	1	0	1	3
Strongly Disagree	0	0	0	0	0	0
No answer	0	0	0	0	0	0
	4	3	23	2	32	100
Q7 - Stentor will generally make it easier for you to accomplish your work?						
Strongly Agree	0	1	7	2	10	32
Agree	3	2	14	0	19	59
Not Sure	1	0	2	0	3	9
Disagree	0	0	0	0	0	0
Strongly Disagree	0	0	0	0	0	0
No answer	0	0	0	0	0	0
	4	3	23	2	32	100
Q8 - Stentor will increase your productivity?						
Strongly Agree	0	1	8	2	11	34
Agree	3	0	11	0	14	44
Not Sure	1	2	4	0	7	22
Disagree	0	0	0	0	0	0
Strongly Disagree	0	0	0	0	0	0
No answer	0	0	0	0	0	0
	4	3	23	2	32	100
Q9 - Stentor will make results available to clinicians faster than with the current PACS?						
Strongly Agree	0	1	9	0	10	31
Agree	1	1	9	2	13	41
Not Sure	3	1	5	0	9	28
Disagree	0	0	0	0	0	0
Strongly Disagree	0	0	0	0	0	0
No answer	0	0	0	0	0	0
	4	3	23	2	32	100
Q10 - Stentor will improve provider to provider communications?						
Strongly Agree	0	1	7	1	9	28
Agree	1	1	9	1	12	38
Not Sure	3	1	7	0	11	34
Disagree	0	0	0	0	0	0
Strongly Disagree	0	0	0	0	0	0
No answer	0	0	0	0	0	0
	4	3	23	2	32	100
Q11 - Stentor would improve provider to patient communications?						
Strongly Agree	0	1	7	1	9	28
Agree	1	1	9	1	12	38
Not Sure	3	1	7	0	11	34
Disagree	0	0	0	0	0	0
Strongly Disagree	0	0	0	0	0	0
No answer	0	0	0	0	0	0
	4	3	23	2	32	100
Q12 - Stentor will improve patient care?						

TIME POINT 1	Radiologist (4)	Clinician (3)	Technologist (23)	Other (2)	Total (32)	Percent
Strongly Agree	0	1	9	1	11	34
Agree	2	1	11	1	15	47
Not Sure	2	1	3	0	6	19
Disagree	0	0	0	0	0	0
Strongly Disagree	0	0	0	0	0	0
No answer	0	0	0	0	0	0
	4	3	23	2	32	100

C. Teleradiology Preliminary Findings

Teleradiology: Stentor Implementation
Preliminary Findings

How it was...
•System: hard to understand - slow - crashes
•Image quality isn't always good
•Too many codes
•Tools are hard to use
•Not pleased with preset views – they don't work right
•Hard to understand pre-fetched configuration
•If archived image is not pre-fetched, takes 5 – 60 minutes to retrieve
•U/S must be read in a separate reading area
•Radiology equipment takes up a lot of space - generates a lot of heat
•Clinical access is cumbersome – limited monitors with Internet
•Clinicians unable to bring up larger studies
•PACS provider - inadequate customer support - too controlling - proprietary issues are too stringent

How it has improved...
•Image quality
•Speed/efficiency
•Equipment
–Monitors
–Accessible
–Simple enough to put on desktop PC
•Workflow integration
•Support
–Customer support
–UPMC programmers
–UPMC help
•Applications
–Image manipulations
–System navigation
–Access to patients in system
–Display options/tools
–Comparing multiple studies
–Three dimensional images
–Selecting images and transitioning to dictation
–Handles large files
–Transfer of digital images
–On-line all the time archiving

How it has improved - comments

•*"I think it has made my diagnostic and therapeutic judgments more accurate."*

•*" What Stentor does is absolutely superb - it takes several different windows and matches up the images as you move through a study. Things like that are impossible with regular film."*

•*"...I can call the radiologist from my desk and discuss things – he can pull up (image) on his machine and I have it on my machine. Yes, I'd have to say I'm more efficient."*

•*"It would increase my productivity to go back and look at a case that I had questions on days ago... I'm learning what the radiologist read versus my read."*

How it can get better...
Radiologists/Clinicians
•Complete data migration
•Automatically attach patient identifiers to exams/dictation
•Integrate with dictation system
•Quick keys for level presets/next exam/'mark' dictated
•Improve measurement tools
•Ability to determine patient locations by looking on image
•Ability to create personal/department folders
•More high-quality image stations in clinical areas
•More/ongoing training on full power of Stentor
•Continued support from UPMC
•Move to distributed worklist for AF
How it can get better...
Technologists
•Ability to delete/reject unwanted images
•Ability to customize personal/department settings
•Option to start typing last name and system will finish it
•Automatic link with patient identifiers
•Display exam by date done instead of date ordered/scheduled
•Make the process of completing an exam shorter
•Better way to find exceptions
•U/S needs to be better integrated with Stentor
•Ability to add studies to worklist before they are completed
•Follow-up training

Project Accomplishments
•DITSCAP – one of the only PACs in the DoD to have this level of security certification
•Data migration – "a minor miracle"
•Outsourcing to Kettering – *"keeping up with demand"*
•Radiology and Clinician Wrappers – *"new wrapper has greatly improved work flow"*
•Equipment upgrades

Some Lessons Learned
•IMITS Project Management

–Each project needs a fulltime project officer
–First phase of project – clearly identify objectives/SOW

•Data Migration
–AF/DoD should determine requirements for retention of patient images
–Critical to look at data migration early on
–Funding must be appropriated
Some Lessons Learned
•DITSCAP
"I don't think anyone appreciated just how difficult this process would be."
–Constraints of process may simply mean that AF will chronically lag in technology
–Proactive support from SG-level may have helped to bring the IA office on board
–Ideally, IA and project managers should work in partnership with each other
–Consider developing software that would enable IA to run tests remotely

D. Dynamic Telepathology Vision and Scope Document

University of Pittsburgh Medical Center
IMITS
Dynamic Telepathology System Development
Vision and Scope Document

Version <Version Number 1.1>
SCO-<IMITS - COOLSCOPE -< Version Number 1.0>
March 25, 2004

Developed for:

US Air Force IMITS

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Distribution List

The following list of people shall receive a copy of this document every time a new version becomes available:

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All revisions made to this document are listed here in chronological order:

Release	Date	Modifier	Description
Version <Version Number 1.1>	<Mar 26 2004 >	<YY >	<Initial template draft>

The current release of this document is considered a complete replacement of previous versions unless otherwise stated.

Additional Information

The Benedum Oncology/Pathology Informatics Center has made every effort to ensure that this document is accurate at the time of printing. Additional copies of this document, as well as updated releases, may be requested from:

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Scope

The Air Force has expressed a need (and included this need in the IMITS deliverables) for a system that allows real time examination of a remote slide. The IMITS group has agreed that NIKON's CoolScope will be the basic technology for the application, but that significant additions must be made to allow CoolScope to operate in the Air Force Network environment, be user friendly, manage user control, and operate in harmony with other IMITS telepathology technologies.`

Proposal

The CoolScope Dynamic Robotic Telepathology system will be developed by following two main steps.

1. Cool Scope Telepathology System Development Stage 1: Full remote/local control of CoolScope with user access control in the Air Force environment:

   1.1. Telnet/FTP version
   1.2. Telnet/FTP-TCP/IP version
   1.3. User access control integration

2. Cool Scope Telepathology System Development Stage 2: UPMC telepathology database integration into the system above (next year):

   2.1. Slide Loader/Bar Code Integration
   2.2. Database integration (case information, image information, hardware information)
   2.3. Database integration with User access control

This document focused on Stage 1 – Full remote/local control of CoolScope in the Air Force Environment.

Customer Requirements

Technical Requirements

1. Base Security, Architecture and System Requirements:
   - The System shall meet the certification and accreditation requirements of DoD IT Security Certification and Accreditation Process (DITSCAP). The system shall conform to security guidelines for Mission Assurance Category (MACIII)/sensitive systems.

Functional Requirements

2. Hardware Installation:

- Equipment (CoolScope, Computers, etc) shall be ordered by UPMC and shall be installed at Keesler, Eglin, and Travis (note: CoolScopes have been delivered to all locations).
- Communications (between instruments) within each institution (AFB) shall be established at Keesler, Eglin, and Travis.
- Communications (between instruments) shall be established between institutions (AFB) Eglin, Keesler, Travis, AFIP and UPMC.

3. The System shall support CoolScope:
    - The CoolScope instruments shall be controlled by the software UPMC will provide.
    - The functions that will be fully controlled by the software are stage coordinates, focus, objective lens, illumination (brightness).
    - The software shall control the CoolScope locally and remotely.
    - The software shall support basic user managment
    - The software shall be implemented as client/server/database architecture.

4. System Evaluation report shall be provided by Keesler:
    - The report will examine the Security and Administration of the UPMC CoolScope implementation
    - The report will examine the Hardware Installation
    - The report will examine the intra and inter AFB communications
    - The report will examine the UPMC software control of CoolScope

5. System integration report shall be provided by UPMC
    - The report will examine the way that the UPMC CoolScope implementation will integrate with other UPMC telepathology systems.

2. Specifications

1. The CoolScope Dynamic Robotic Telepapathology system allows pathologists to make remote diagnosis including consultation on frozen sections. Multiple pathologists can be connected and control a CoolScope through the network. User can control a CoolScope located at a remote site and capture images with watching real time dynamic image (depends on the network bandwidth) securely through a system. All participants can communicate by telephones or chat windows provided by the system. Because of the robotic function of the CoolScope, users can go back to important fields at any time they want if once images are captured.

2. Typical operations: Using the functions described in (1), at typical CoolScope consultation will run as follows: (a) Local personnel enter case information into the IMITS Static Telepathology System and place a glass slide into the CoolScope. (b) A remote pathologist looks at the slide through the system and looks at the case information using static image telepathology. (c) Local and remote pathologists can chat using Static Image telepathology system and save static images captured in CoolScope into the static telepathology database. (4). Pathologist saves images and final diagnosis into static image database for future reference if desired. Note: next year, the database will be merged for all telepathology projects.

3. A significant technical challenge is that the CoolScope (OTS) allows only telnet and FTP protocol to access (communication) to/from a computer on a network. However, telnet and FTP protocols are not permitted to use within Air Force network. To avoid use FTP/Telnet within Air Force network, each IMITS CoolScope instrument will be paired with a a PC which is installed with Windows 2000 Server as an OS and equipped two network cards, one to connect to the network and one to connect directly to the CoolScope instrument. The PC will translate Telnet and FTP messages from/to the CoolScope into TCP/IP messages for the network. The CoolScope/PC pair is called the IMITS CoolScope Dynamic Telepathology System (ICDTS) and the software that runs it the IMITS CoolScope Dynamic Telepathology Software System (ICDTSS). See sections 4 and 5 below.

4. The ICDSS software shall be configured as a server and client. The server software will be installed in all Window 2000 PC's paired with a CoolScope instrument. The client software will be installed in all Window 2000 ICDTS Server PC. It will also be installed on any PC in the Air Force Network that needs to control CoolScope over the Air Force Network.

5. When the server communicates with the CoolScope instrument, FTP/Telnet protocol will be used. The other hand, when the server communicates with the Client, TCP/IP Protocol will be used. The server software includes the translation part between FTP/Telnet and TCP/IP.

6. Security and User Managment: The CoolScope instrument has limited security functions. The general security concern of the CoolScope instrument is that anyone can access any CoolScope (as long as it is on)through the internet by Web Browser. Although the CoolScope itself can set up one user name and password for each CoolScope and limit the IP addresses to be connected, it does not help to avoid multiple users try to control the

CoolScope at the same time. Also there is no way to know who is actually using a CoolScope from a known (or unknown IP). To overcome this problem and make the system acceptable to US Air Force security policy, the server PC (the PC directly connected to each CoolScope instrument and acts as the only gateway from the CoolScope to the network) will act in a security function. The server software will manage user access level and keep logs information.

7. As discussed above, the CoolScope device and its associated server PC will be connected by cross cable and Server PC will connect to clients through the network. Also all commands are translated between TCP/IP and Telnet/FTP. Therefore no one will have direct access to CoolScope devices through the LAN.

8. The Server shall contain UPMC/IMITS software that will manage the users access levels and IPs. For example, only the most powerful user will have full control, but he will be able to pass the control privilege to other pathologists (from other sites connecting through different clients) for a given session. This information is saved in the server associated with the CoolScope device. The software will allow access levels to be set for each user and CoolScope. Each client can have a different access level for each CoolScope.

2.1 System Architecture

The CoolScope Dynamic Telepathology System shall be implemented with the following client-server architecture. Application server directly connected to each CoolScope device, plus any number of application clients installed on remote PCs. Fig. 1 shows Air Force Telepathology Network for the CoolScope.

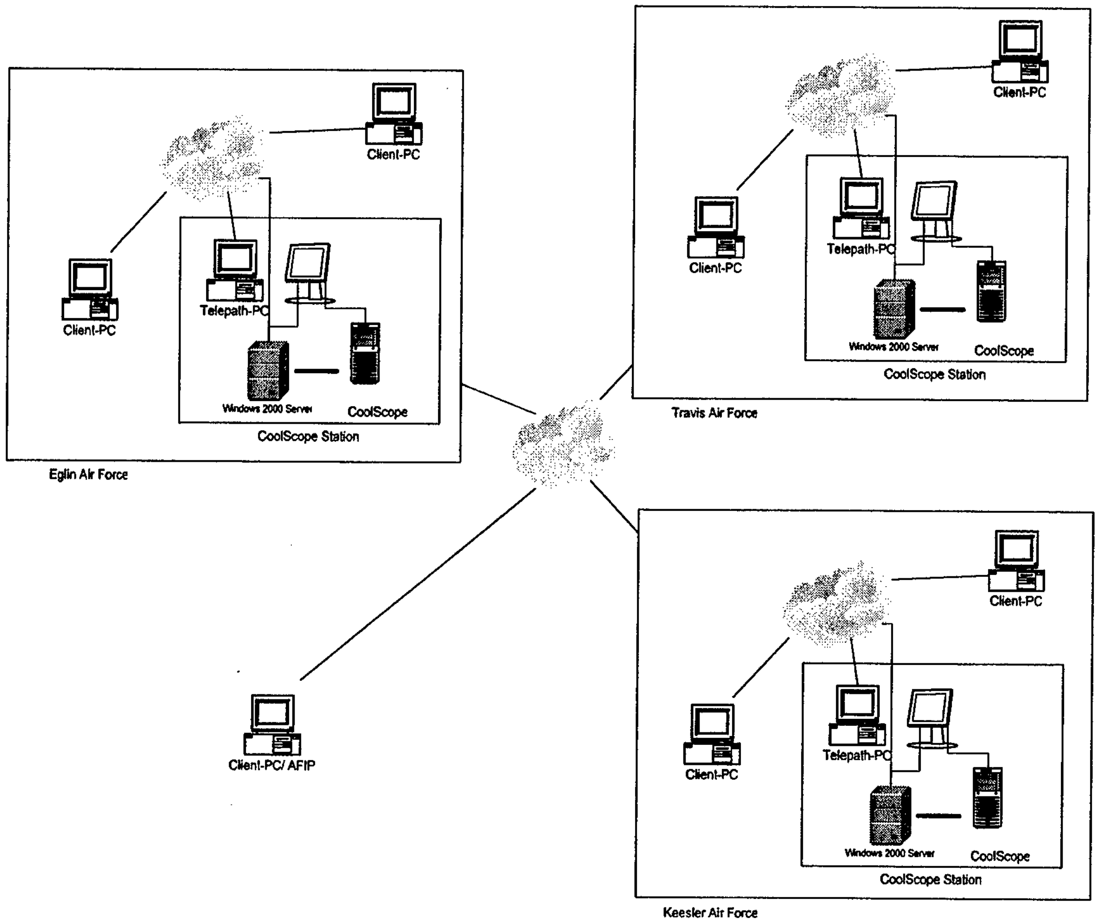


Fig. 1. CoolScope Telepathology Network

The CoolScope Telepathology Network has two main components. 1. CoolScope Station, which contains a CoolScope device and server PC (and local client) and 2. A client only station (on a PC) to control a CoolScope from a remote location. The system will be used internally (within an AFB) and externally (between AFBs).

2.2 Hardware

2.2.1 CoolScope Station (Local Station)

Fig 2 shows a CoolScope Station

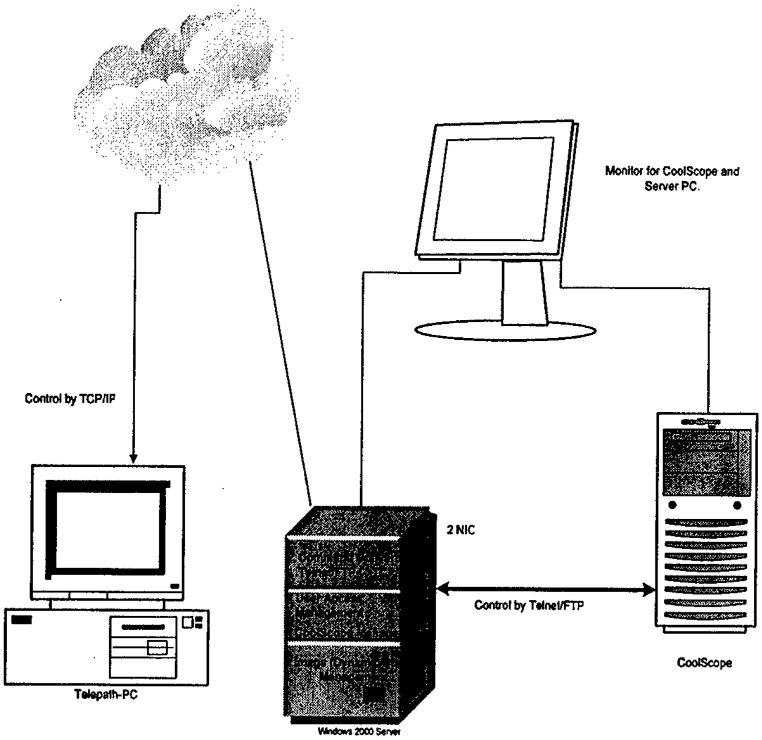


Fig. 2. CoolScope Station

CoolScope Station consists of

- CoolScope
- PC
    - OS: Windows 2000 Server
        1. Two NIC cards: 1. CoolScope and 2. Network
    - CoolScope Telepathology Server Software
    - CoolScope Telepathology Client Software

The monitor that comes with CoolScope will be shared with the server PC.
Most of the time, user does not need to see the screen directly from the CoolScope. If the

CoolScope has a problem, the user will need it.

2.2.3 Client Station (Remote Station)

Client Station

- OS: Windows 2000 Workstation*
- CoolScope Telepathology Client Software

* This workstation will be shared with IMITS Static Image Telepathology

2.3 Software

At least parts of both the Server and Client software shall written in C for communication with the CoolScope device.

Server Software and Client software are described in 2.3.1 and 2.3.2.

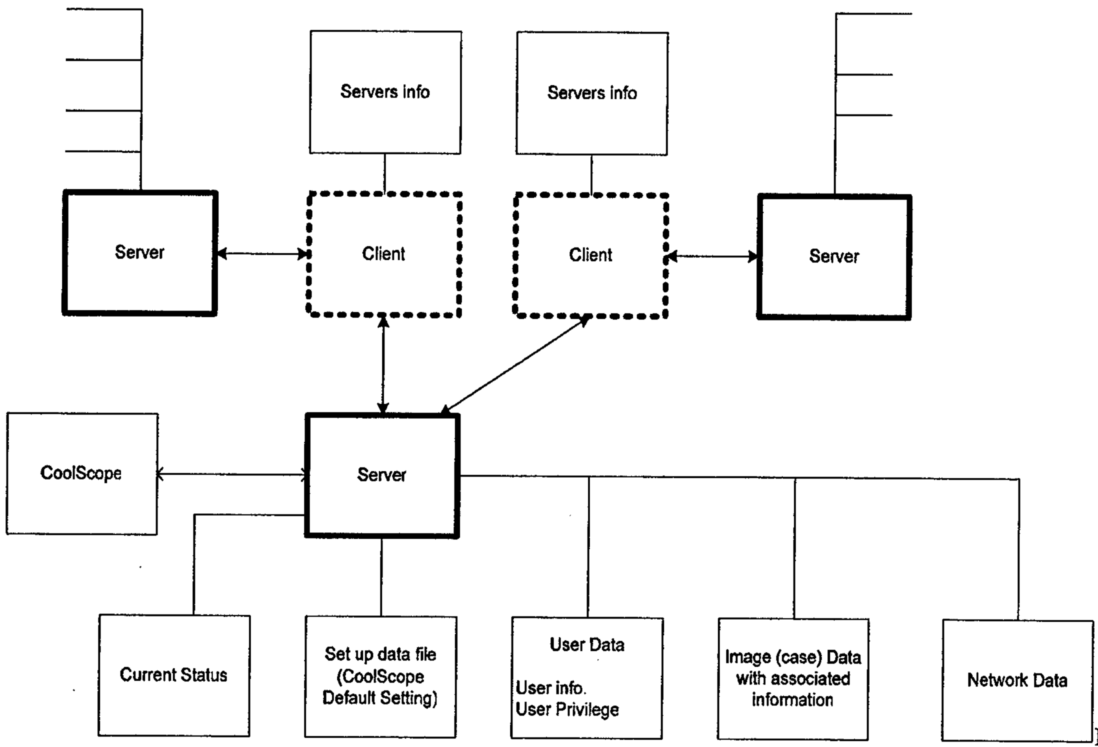


Fig. 3

Software Architecture

2.3.1 CoolScope Telepathology Server Software

Server software provides services to other computer programs on the same or other computers. The computer running a server program is also frequently referred to as a server though it may contain sever and client programs. The server software maintains and manages all commands from all clients. When the server sends a command to the CoolScope device, the command protocol is translated from TCP/IP to Telnet/FTP.

The Server Software shall have the following modules.

- Server Setting
- CoolScope Remote/Local Management
- User/Security Management
- Data Management

Those modules shall communicate with the following data files.

- Current Status: Real time CoolScope status
- Set up data file: Default CoolScope Setting data

- User Data: User information such as user ID, password, location, default privilege, etc.
- Image (case) Data: Saved images with associated information such as CoolScope condition when an image was captured and case information, recorded chat discussions if desired.
- Network data: Network information including IP, port, statistic, and user logs

Server Setting

- GUI/system set up
    i. Window size
    ii. Priority: Quality vs. Speed
    iii. Static image file resolution and format
    iv. CoolScope setting
    v. Power On/Off
    vi. File Name
    vii. Directory for file archive
    viii.
- CoolScope Remote/Local Management
- User/Security Management
- Data Management

1. User/Security Management

This module maintains information on each user's access and each CoolScope usage

- User ID and Password
- Limiting connectable IPs

2.3.1 CoolScope Telepathology Client Software

The CoolScope Telepathology client software may be installed on any number of PCs. Client installations are currently planned for Keesler AFB, Eglin AFB, Travis AFB and Armed Forces Institute of Pathology (AFIP). The client software consists of 1) servers management and 2) CoolScope Remote/Local Control, and 3) Data entry and view. Communication between the clients and servers is across the Defense Information Systems Network (DISN) and/or public Internet, as appropriate.

Four CoolScopes are placed within DISN. Each client can have access to each CoolScope through the server. One client will have different access level to each server.
If the client comes from the same IP address with the server, the client acts as Local Client and has full control of the CoolScope.
Each CoolScope will have one primary client at remote location. The primary remote client has the privilege to decide who has full control at that moment.
On the screen, all clients will be able to see all participants' names and privileges.

2.2 Other Pieces

Table 3-1–Hardware Required for CoolScope Telepathology System				
Server	**Vendor**	**Model #**	**CPU/RAM**	**Storage**
Application Server	DELL	OptiPlex GX270 Small MiniTower	3.2GH 2GB	120GB

Table 2.3.1–COTS Software Required for CoolScope Telepathology System			
Server/Software	**Version**	**IA Certification**	**Comments**
Application Server			
Microsoft Windows 2000 Advanced Server		See Windows 2000	Operating System
Client PCs			
Microsoft Windows 2000 Professional		See Windows 2000	Operating System

Table 2.3.1–Custom Software Required for Static Telepathology System			
Server/Software	**Version**	**IA Certification**	**Comments**
Application Server			
CoolScope Telepathology Server Program	1	To be certified as part of project	Custom C software to be supplied by UPMCHS.
Client PCs			
CoolScope Telepathology Client Program	1		Custom C software to be supplied by UPMCHS.
Static Telepathology client (installed)	2.5	To be certified as part of project	Custom Java software to be supplied by UPMCHS

2. Cost and Timeline

3.1 Timeline

1-2 W, April, 2004: Purchasing PCs, System Design in Detail

April 15th, 2004: System Specifications including GUI, flowchart will be given to a programmer

April 30th 2004 : CoolScope management module (telnet/FTP version) and Image Data Management Module (capture static images and send to IMITS Static System) will be delivered to UPMC from Programmer.

May 1st - May 15th : System test at UPMC

May 1st - May 31st": User/System Management module and TCP/IP translation version will be delivered to UPMC

June 1st - June 30th: Final testing at UPMC, Documentations

Communications (IP/TCP)

User Management

Static Image Management

2. **Server Setting**
3. **CoolScope Remote/Local Management**
4. **User/Security Management**

Data Management

3.1 Estimate Costs

Estimate Cost to develop 1st phase system will be $35,000

3.1.1 Hardware Costs

Four CoolScopes for UPMC, Keesler, Eglin and Travis have been purchased and delivered.

PCs with Window 2000 Server OS: $3,000 x 4 (Keesler, Eglin, Travis and UPMC) $12,000

Client PC with Static Image Telepathology Software (for UPMC Development): $3,000

3.1.2 Software Development

Full time senior programmer for two months: $20,000

Person of DITSCAT and documentation $________

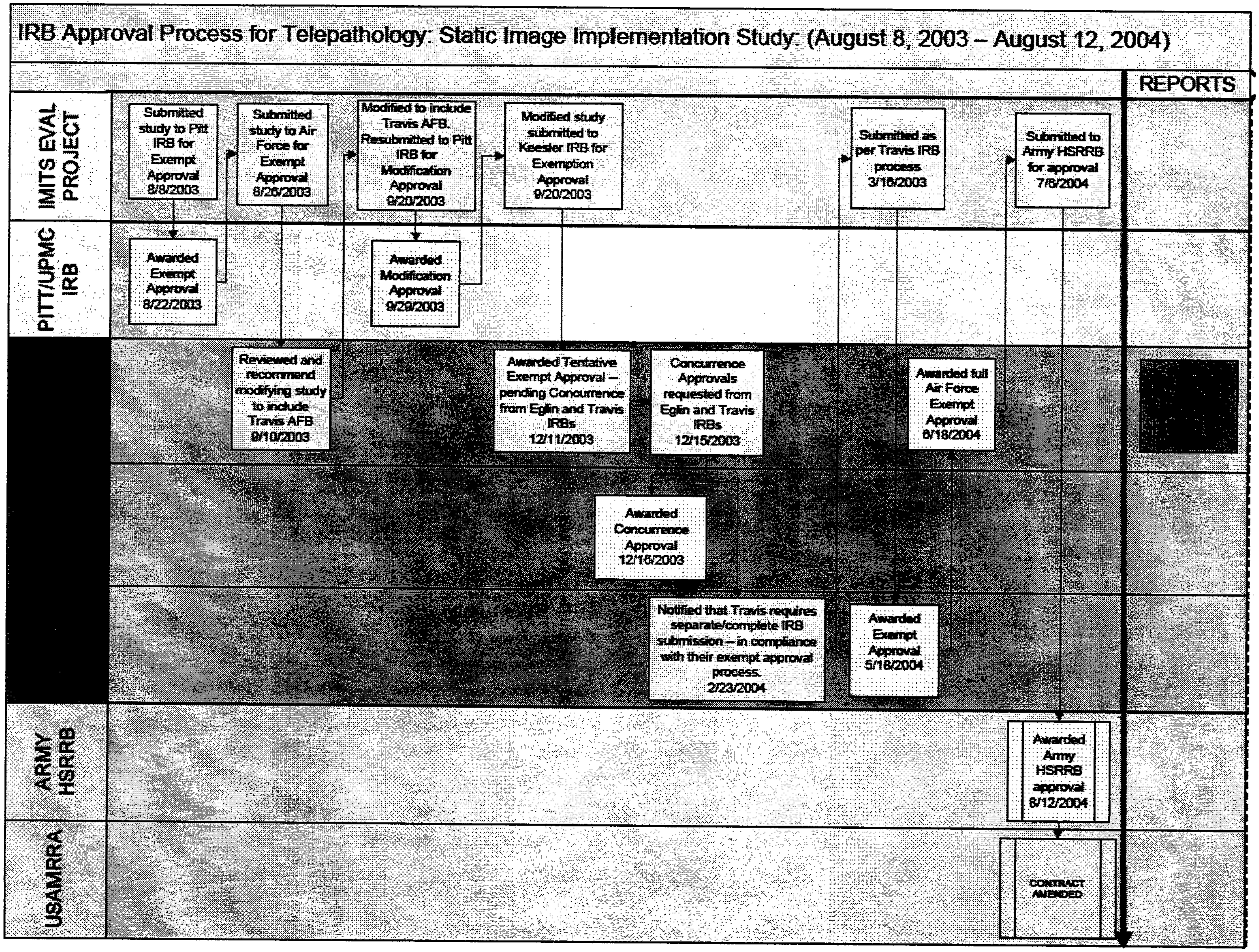
E. 2 Telepathology Survey Data

Time Period 1 Static Imaging Version 1.1	**Pathologist**	**Other**	**Total**	**Percent**
Q1: Helps in getting second opinion?				
Strongly Agree	1	2	3	27%
Agree	6	1	7	64%
Neither	1	0	1	9%
Disagree	0	0	0	0%
Strongly Disagree	0	0	0	0%
No answer	0	0	0	0%
	8	3	11	100%
Q2: Easy to capture load images?				
Strongly Agree	4	2	6	55%
Agree	3	1	4	36%
Neither	0	0	0	0%
Disagree	1	0	1	9%
Strongly Disagree	0	0	0	0%
No answer	0	0	0	0%
	8	3	11	100%
Q3: Easy to enter data?				
Strongly Agree	3	1	4	36%
Agree	4	2	6	55%
Neither	1	0	1	9%
Disagree	0	0	0	0%
Strongly Disagree	0	0	0	0%
No answer	0	0	0	0%
	8	3	11	100%
Q4: Images can be up in a timely manner?				
Strongly Agree	3	2	5	45%
Agree	4	1	5	45%
Neither	0	0	0	0%
Disagree	0	0	0	0%
Strongly Disagree	0	0	0	0%
No answer	1	0	1	9%
	8	3	11	100%
Q5: Quality suitable for diagnosis?				
Strongly Agree	3	1	4	36%
Agree	3	2	5	45%
Neither	2	0	2	18%
Disagree	0	0	0	0%
Strongly Disagree	0	0	0	0%
No answer	0	0	0	0%
	8	3	11	100%
Q6: Management intuitive?				
Strongly Agree	2	2	4	36%
Agree	3	1	4	36%
Neither	1	0	1	9%
Disagree	1	0	1	9%
Strongly Disagree	0	0	0	0%
No answer	1	0	1	9%
	8	3	11	100%

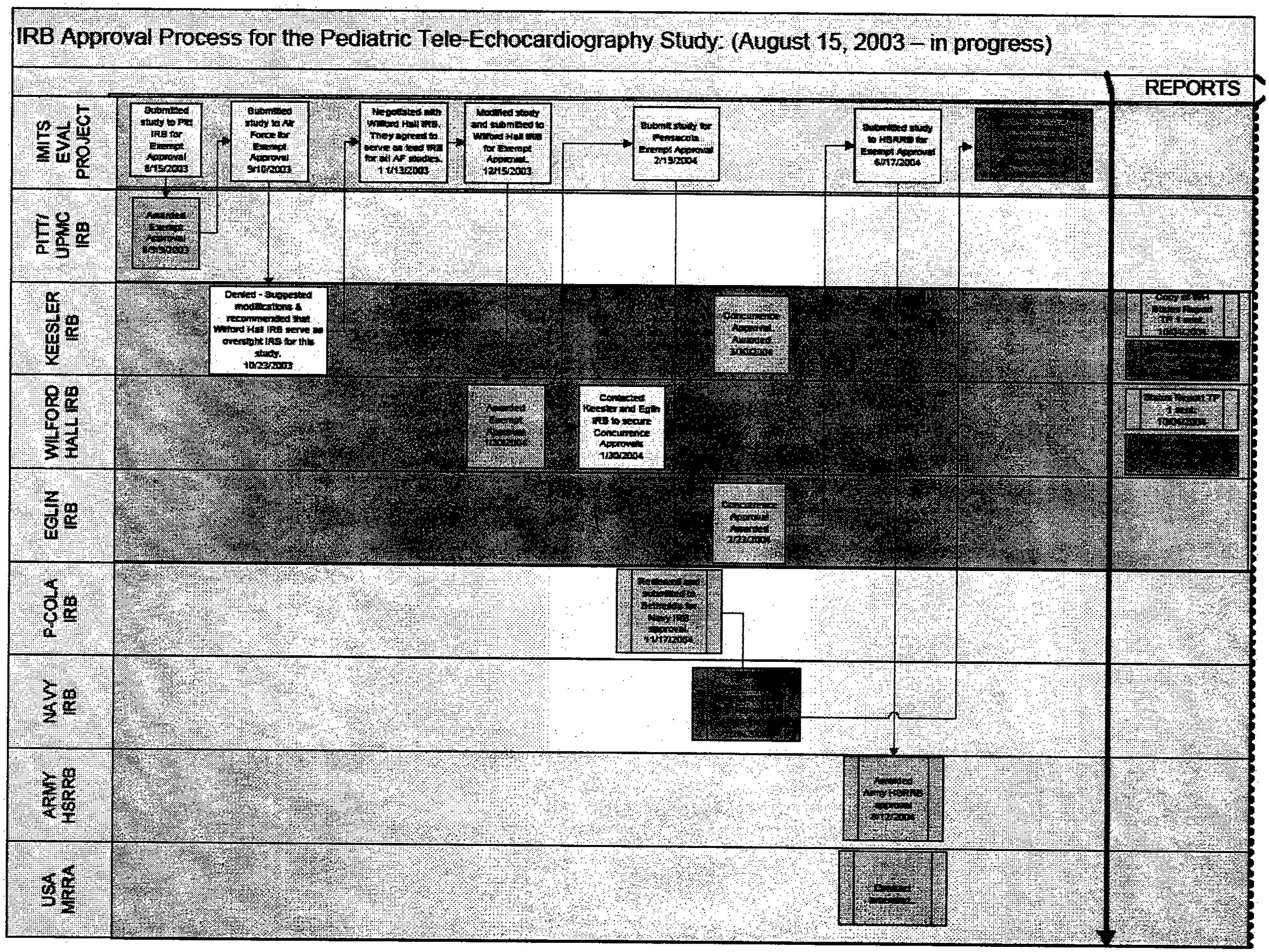
Time Period 1 Static Imaging Version 1.1	Pathologist	Other	Total	Percent
Q7: Chat easy to use?				
Strongly Agree	2	1	3	27%
Agree	2	2	4	36%
Neither	3	0	3	27%
Disagree	0	0	0	0%
Strongly Disagree	0	0	0	0%
No answer	1	0	1	9%
	8	3	11	100%
Q8: Chat facilitates diagnosis and service?				
Strongly Agree	2	1	3	27%
Agree	3	1	4	36%
Neither	2	0	2	18%
Disagree	0	1	1	9%
Strongly Disagree	0	0	0	0%
No answer	1	0	1	9%
	8	3	11	100%
Q9: System facilitates quality assurance?				
Strongly Agree	2	1	3	27%
Agree	4	1	5	45%
Neither	1	1	2	18%
Disagree	0	0	0	0%
Strongly Disagree	0	0	0	0%
No answer	1	0	1	9%
	8	3	11	100%
Q10: Images and data are comprehensive / relevant?				
Strongly Agree	2	2	4	36%
Agree	3	1	4	36%
Neither	2	0	2	18%
Disagree	0	0	0	0%
Strongly Disagree	0	0	0	0%
No answer	1	0	1	9%
	8	3	11	100%
Q11: Improved pathologist-to-pathologist communications?				
Strongly Agree	1	1	2	18%
Agree	5	2	7	64%
Neither	1	0	1	9%
Disagree	0	0	0	0%
Strongly Disagree	0	0	0	0%
No answer	1	0	1	9%
	8	3	11	100%
Q12: Improved pathologist-to-clinician communications?				
Strongly Agree	1	1	2	18%
Agree	2	0	2	18%
Neither	4	2	6	55%
Disagree	0	0	0	0%
Strongly Disagree	1	0	1	9%
No answer	0	0	0	0%
	8	3	11	100%
Q13: Improved outside consultations?				
Strongly Agree	2	1	3	27%
Agree	3	2	5	45%
Neither	3	0	3	27%

Time Period 1 Static Imaging Version 1.1	Pathologist	Other	Total	Percent
Disagree	0	0	0	0%
Strongly Disagree	0	0	0	0%
No answer	0	0	0	0%
	8	3	11	100%
Q14: Improved patient care?				
Strongly Agree	1	1	2	18%
Agree	4	2	6	55%
Neither	3	0	3	27%
Disagree	0	0	0	0%
Strongly Disagree	0	0	0	0%
No answer	0	0	0	0%
	8	3	11	100%

F. 3 Telepathology IRB Flow Chart



G. Echo IRB Process



H. Revised SOW

EMEDS Task List and Deliverables Amendment

Technical Services Required

The subcontractor will assist in the security evaluation of the wireless communications system and network design of the Expeditionary Medical Support (EMEDS) tent and recommend the best configuration of the system. The subcontractor will provide a technical compliance review document based on Air Force recommended hardware/software/architecture platform for wireless and network technology for the EMEDS tent. The subcontractor will focus on DoD, Air Force and HIPPA communications security compliance requirements. The subcontractor will also make recommendations for configuration and training to implement and test the communications system.

Tasks to be completed

- Gather equipment, network and security requirements (including site visit to EMEDS XTI test facility), for the EMEDS wireless communication system.
- Provide compliance recommendations for secure wireless local area network capability
- Provide detailed diagrams and specifications (including recommended access point locations) for the EMEDS tent wireless local area network configuration Test the wireless local area network access point(s) configuration(s)
- Provide technical writing support and documents on security/HIPPA compliance
- Provide training recommendations for configuration, implementation and testing of the wireless communications system

Deliverables

Evaluate the communication equipment and security requirements. Establish security recommendations and configuration design document for a prototype wireless local area network broadband telecommunication network.

1. Conduct needs assessment with the AFMS and UPMC personnel
2. Define project scope at EMEDS XTI facility
3. Define the communication system configuration requirements
4. Define security evaluation criteria
5. Develop and submit technical services plan for review and approval
6. Develop communication system configuration design document
7. Submit design and security review recommendations document - deliverable to UPMC and AFMS for review and final approval
8. Define, select and test communication equipment configuration
9. Implement wireless network configuration at the EMEDS XTI test facility
10. Evaluation, data collection and analysis
11. Submit final evaluation and training recommendation report

Acceptance Criteria

Review and acceptance of documents and requirements as outlined in the Deliverables section.

Government Furnished Resources

Facilities, Supplies and Services

The following items will be provided by the Government to the subcontractor to accomplish the work:

- Access to the Fort Detrick and Air Force EMEDS XTI test facility
- Access to EMEDS network/bandwidth
- Access to power supply

Information Sources

The following Government furnished information will be provided to the subcontractor to accomplish the work:

- Provision of EMEDS IT information on EMEDS tent
- Provision of technical specifications on computer equipment
- Provision of specific security requirements

Documentation

The following Government documents will be provided to the subcontractor to accomplish the work:

- EMEDS IT Handbook (electronic format)